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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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ART UNIT	**PAPER NUMBER**
2123	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/887,697	LEE ET AL.	
	Examiner	Art Unit	
	Jason Proctor	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 April 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *5-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *5-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11 January 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claims 5-16 and 18-20 were rejected in Office Action of 17 January 2006. Applicants' response of 17 April 2006 has cancelled claims 18-20 and amended claims 5-7, 11, and 13. Claims 5-16 are pending in this application.

Claims 5-16 are rejected.

Claim Objections

1. Claims 5-7 are objected to because of the following informalities: The amendments to these claims improperly show deleted subject matter. 37 CFR 1.121(c)(2) states:

> The text of any deleted matter must be shown by strike-through except that double brackets placed before and after the deleted characters may be used to show deletion of five or fewer consecutive characters. The text of any deleted subject matter must be shown by being placed within double brackets if strike-through cannot be easily perceived.

Each of these claims attempts to delete more than five characters using double brackets. The use of strike-through would have been easily perceived in each of these claims.

In the interest of compact prosecution, these non-compliant amendments will be overlooked and all text found within double brackets will be regarded as deleted. However, any subsequent amendments will be required to comply with 37 CFR 1.121.

2. Claim 5 is objected to because of the following informalities: Claim 5, as amended, reads "A method of determining a a head-media spacing modulation..." which is improper English grammar. Appropriate correction is required.

Claim Interpretation

3. Claims 11-15 were previously objected to as being of improper dependent form for failing to further limit the subject matter of a previous claim. In response, Applicants' submit that:

> Claims 11-15 were objected as neither claim 5 nor 11 (or 13) recite any use, application, or involvement with "a model for glide avalanche." See paragraph 1 of the Action. This objection is respectfully traversed and should be overcome in light of this Amendment.

The Examiner respectfully submits that no traversal of that objection has been found in Applicants' response.

Applicants' amendments to the claims do not address the issue raised in the previous objection. However, that objection has been withdrawn upon further consideration.

Claims 11 and 13 depend from claim 5 and recite "the method of claim 5 further comprising providing a model for glide avalanche (GA) to relate head-media spacing modulation with variables affecting processing of the actual disc media surface..." The underlined portion corresponds to the amended claim language and is clearly restricted to an ***intended use*** of the model for glide avalanche. This amendment in no way addresses the lack of interaction between the method of claim 5 and "a model for glide avalanche". However, claims 11 and 13 do further limit the method of claim 5 by requiring the provision of "a model for glide avalanche."

Claim 5 positively recites no steps or limitations that require, make use of, or interact with "a model for glide avalanche." Claims 11 and 13 positively recite no steps or limitations that define any such interaction, save for "providing [a model]". Therefore, although claims 11 and 13 appear to recite *non sequitur* limitations because these

limitations bear no relation whatsoever to the parent claim, they are nonetheless further limiting.

However, when looking to the prior art for anticipatory and teaching references, the issue of equivalence must be addressed. Where claims 11 and 13 require the inclusion of "a model for glide avalanche" that has no relation to the method of claim 5, this requirement is interpreted as equivalent to the method of claim 5. Therefore a reference that anticipates or renders obvious the method of claim 5 will similarly anticipate or render obvious the method of claims 11 and 13. The step of "providing a model for glide avalanche" has no meaningful contribution to the method of the parent claims and therefore defines an equivalent method.

If Applicants' find this interpretation unfavorable, the Examiner respectfully requests clarification regarding the intended interpretation of these claims based upon the plain and unambiguous claim language.

Claim Rejections - 35 USC § 101

35 U.S.C. § 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

4. Claims 5-16 and 18-20 are rejected under 35 U.S.C. § 101 because the claimed invention is directed to non-statutory subject matter.

Independent claim 5 recites an abstract mathematical algorithm that does not produce a useful, concrete, and tangible result as required by MPEP 2106 to establish a statutory method.

In response, Applicants' argue primarily that:

> The Examiner's argument is that the invention of these claims is directed to a non-statutory subject matter. This is totally incorrect. The Examiner cited MPEP 2106 for the proposition that an invention should produce "useful, concrete, and tangible result." The present invention meets this criterion.
>
> In the disc recording media industry, minimizing disc roughness has been the primary focus to improve glide avalanche performance of a magnetic disc. [...] Prior art roughness models that depend on Ra alone could no longer be used to predict disc glide avalanche performance. Thus, a more precise model, which considers both Ra and micro-waviness effects was needed prior to this invention.
>
> This invention meets this long-felt need by providing useful, concrete and tangible results that relate head-media spacing modulation with variables affecting processing of the actual disc media surface. These results are useful in both determining the quality of the disc media as well as for determining the variables that affect processing of the disc media surface.

The Examiner respectfully traverses this argument as follows.

The claimed invention fails to produce a tangible result. Claim 5 defines an abstract mathematical algorithm. The result of this abstract mathematical algorithm, as claimed, is a "head-media spacing modulation". Although this invention could be interpreted as a statutory method, the claimed method ***is not limited*** to an interpretation wherein a "head-media spacing modulation" is other than an ***abstract mathematical result***.

During patent prosecution, claims are given a broad, reasonable interpretation as per MPEP 2111, 2106. When a claim is subject to two interpretations, one statutory and one non-statutory, the claims should be rejected as directed to non-statutory subject matter. Applicant always has the opportunity to amend the claims during prosecution, and broad interpretation by the examiner reduces the possibility that the claim, once issued, will be interpreted more broadly than is justified.

The Examiner does not challenge the correctness of Applicants' remarks. However, the claim ***is not limited*** to Applicants' interpretation that a "head-media

spacing modulation" constitutes a useful, concrete, ***and tangible*** result. In contrast, the claim defines a "head-media spacing modulation" as the ***mathematical result*** of multiplication. Therefore the claim is directed to an ***abstract process*** that fails to produce a useful, concrete, and tangible result.

Applicants' arguments have been fully considered but have been found unpersuasive.

Independent claim 16 recites a method of "determining head-media spacing (HMS) modulation model" which is a mathematical abstraction. Indeed the result of the method is a step of determining numerical or mathematical data. Similar to claim 5, claim 16 fails to produce a useful, concrete, and tangible result. In order to define a statutory method, the claim should result some practical application of the "simulated head-media spacing modulation" that results in a useful, concrete, and tangible result.

Independent claim 18 recites an "apparatus" defined in "means for" language. In light of the disclosure, claim 18 refers to a software "apparatus" and thus is nonstatutory for defining software *per se*.

Regarding the rationale for all of these rejections under 35 U.S.C. § 101, please see MPEP 2106, in particular MPEP 2106(II)(A) regarding a useful, concrete, and tangible result.

Claims rejected but not specifically mentioned stand rejected by virtue of their dependence.

To expedite a complete examination of the instant application the claims rejected under 35 U.S.C. § 101 (nonstatutory) above are further rejected as set forth below in

anticipation of applicant amending these claims to place them within the four statutory categories of invention.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. § 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 5-15 are rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 5 recites the limitation "multiplying the topography function and the air bearing transfer function to provide the head-media spacing modulation" which is not adequately described in the specification.

Regarding the previous rejection of claim 5 under 35 U.S.C. § 112, first paragraph, as lacking written description, Applicants submit that:

> The Examiner states that careful consideration of disclosure fails to reveal an act of "multiplying the topography function and the air bearing function transfer function [sic]" that results in "a spread in values of the head-media spacing modulation" [*equivalent to "a head-media spacing modulation* spectrum*" according to Applicants' definition of the term* spectrum*, (Applicants' remarks, 30 June 2005, page 6) –Examiner*]. Foremost, the Examiner is making a basis error in ignoring the claims as being part of the complete disclosure. Thus, on its face, the Examiner's statement that the disclosure fails to reveal an act of "multiplying the topography function and the air bearing function transfer function [sic]" which results in "a spread in values of the head-media spacing modulation" is incorrect. This act is disclosed in the specification in claim 5 in the

> original application. Furthermore, Applicants respectfully submit that Equation (1) mathematically discloses multiplying the topography function and the air bearing function transfer function [sic] on the left hand side and the right hand side of the equation discloses a spread in values of the head-media spacing modulation. In short, it appears that the Examiner has failed to understand the mathematical equations in the specification.

The Examiner thanks Applicants for the helpful remarks.

The Examiner notes that Applicants have elected to amend the limitation at issue, from "multiplying the topography function and the air bearing transfer function to provide the head-media spacing modulation **spectrum**," which Applicants allege is fully described in the specification as filed by virtue of original claim 5 and Equation (1). This amendment has deleted the word "spectrum". It is specifically noted that Applicants have previously acted as their own lexicographer regarding this term by stating for the official record:

> The term "spectrum" simply means a spread in values of the head-media spacing modulation. There is nothing indefinite about the term "spectrum." Applicants have the right to be their own lexicographer. (Applicants' remarks, 30 June 2005, page 6)

Therefore Applicants' arguments regarding the original limitation appear to be moot. It would appear incontrovertible that a "modulation" is not a "spectrum" by any reasonable definition, and therefore Applicants' amendments to claim 5 have altered the scope of the claim.

While the original claim may have fully complied with 35 U.S.C. § 112, first paragraph, as alleged by Applicants due to the original text of the claims, the same rationale cannot be applied to newly amended claim 5.

Applicants' arguments have been fully considered but have been found unpersuasive.

Inasmuch as Applicants would find support for the amended claim 5 in Equation (1), the Examiner addresses this argument as follows.

The specification (page 5, lines 13-25) discloses:

> The invention provides a new glide avalanche (GA) model, namely
>
> $$GA = a\,[\int \Lambda^2(\lambda) Y(\lambda) d(\lambda)]^{1/2} + b \quad (1)$$
>
> Where the integral boundaries are from zero to one revolution of a disc media.
>
> Constant "a" in Equation (1) represents a relationship of glide avalanche to root-mean-square (RMS) of disc-head modulation. Constant "b" in Equation (1) represents other possible effects, such as roughness of the lubricant and head. Scaling factor "a" and "b" may be experimentally derived.
>
> Function "Y" in Equation (1) is a power spectral density of disc topography. Function "Λ" in Equation (1) is an air bearing transfer function in amplitude gain. Wavelength "λ" in Equation (1) is a variable dependent on disc topography. From Equation (1), HMS modulation may be described as,
>
> $$HMS\_Modulation = [\int \Lambda^2(\lambda) Y(\lambda) d(\lambda)]^{1/2} \quad (1A)$$

The Examiner respectfully submits that none of this describes the claimed step wherein a "topography function" (function "Y") and an air bearing transfer function (function "Λ") are multiplied to provide the head-media spacing modulation. The specification appears to disclose a completely different equation, wherein **the square root of the integral of the squared topography function multiplied by the air bearing transfer function** provides a head-media spacing modulation.

However, Applicants have submitted that the Examiner has "failed to understand the mathematical equations in the specification" (Applicants remarks, page 6). Therefore the Examiner respectfully requests clarification from Applicants regarding the meaning of Equations (1) and (1A), and especially which of the equations in the specification

disclose the newly amended limitation, "multiplying the topography function and the air bearing transfer function to provide the head-media spacing modulation."

The Examiner respectfully suggests Applicants carefully consider whether the claim language adequately corresponds to the disclosed invention.

Regarding the use of the term "convoluted" as a verb, the previous Office Action states (page 5):

> The Examiner is unaware of the meaning of the term "convoluted" when used as a verb. Presumably Applicants' mean the term "convolved," but do Applicants' define "convolved" as synonymous with "multiplied?"

In response, Applicants submit that:

> The Examiner also states that he is unaware of the term "convoluted". Applicants respectfully submit that this is a well known term in mathematics. However, in order to overcome the Examiner's confusion regarding "convoluted" and whether "power spectral density function" is synonymous with "topography function," Applicants first request the Examiner to focus on Equation (1A) of the specification. In this equation, function "Y" is a power spectral density of disc topography, function "Λ" is an air bearing transfer function, and "λ" is a variable dependent on disc topography. The product of the power spectral density and air function integrated as shown in Equation (1A) results in the head-media spacing (HMS) modulation. In short, the ordinary reading of claim 5 in light of Equation (1A) shows that "power spectral density function" is synonymous with "topography function." Also, the term "convoluted" or "convolution" is "an integral that expresses the amount of overlap of one function *g* as it is shifted over another function *f*. It therefore "blends" one function with another." [cit. omitted] The Examiner is kindly requested to visit the website listed above as it explains the meaning of convolution with animations that graphically illustrate the convolution of two rectangle functions and two Gaussians. If the Examiner still fails to understand this invention and the meaning of convolution, then the Examiner is requested to discuss these issues with another Examiner who has a background in mathematics.

The Examiner thanks Applicants for the helpful remarks.

Firstly, the Examiner has not stated that he is unaware of the term "convoluted." The term "convolution" and "convolve" are indeed well known terms in mathematics, while "convoluted" is also a well-known term in general in the English language. For

example, The American Heritage College Dictionary, Fourth Edition (Houghton Mifflin Company) defines:

convoluted *adj.* 1. Having numerous overlapping coils or folds. 2. Intricate, complicated.

convolve *v.* **–volved, -volving, volves** To roll together; coil up

convolution *n.* 1. A form or part that is folded or coiled. One of the convex folds of the surface of the brain.

Merriam-Webster's Collegiate Dictionary, Tenth Edition (Merriam-Webster, Incorporated) defines:

convolute *vb* **–luted; -luting** Twist, coil

convoluted *adj* 1. having convolutions 2. involved, intricate

convolution *n* 1. a form or shape that is folded in curved or tortuous windings 2. one of the irregular ridges on the surface of the brain and esp. of the cerebrum of higher mammals 3. a complication or intricacy of form, design, or structure

convolve *vb* **convolved; convolving**; *vt* to roll together; *vi* to roll together or circulate involvedly

The Examiner thanks Applicants for providing a link to the Mathworld Internet site. The Examiner has reviewed this document and has found no use of the term "convoluted" as conjugated and used by Applicants.

Secondly, the comments in the record regarding Applicants' use of the term "convoluted" were an invitation for Applicant to clarify the precise meaning of the term

as used in this application. In a prosecution history that reveals after two Official Actions that the term "power spectral density function" is synonymous with "topography function," it is difficult for the Examiner to foresee what other terms will be equivalent. The Examiner thanks Applicants for their patience and cooperation in this endeavor. The Examiner respectfully submits that understanding the invention is not believed to be a source of confusion in this application, but acknowledges Applicants' concerns.

From Applicants' remarks it can be reasonably inferred that the term "convoluted" used in this application is the past tense conjugate of the mathematical operation "convolve," and does not mean "complicated," "twisted," or "rolled together or circulated involvedly." The Examiner respectfully submits that simply clarifying the meaning of this term would have been a sufficient response.

The Examiner respectfully submits that comments such as suggesting that the Examiner "discuss these issues with another Examiner who has a background in mathematics" could be interpreted as non-compliant with 37 CFR 1.3.

Claims rejected but not specifically mentioned stand rejected by virtue of their dependence.

The following is a quotation of the second paragraph of 35 U.S.C. § 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 5-15 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 5 recites the step of "simulating a head passing in near proximity to a simulated disc media surface to generate an air bearing transfer function" but does not recite the relationship between such a simulation and the generation of an air bearing transfer function.

In response, Applicants argue primarily that:

> Applicants respectfully submit that the Examiner should kindly review paragraphs [0029] and [0030] on page 7 of the specification. In particular, paragraph [0030] explains, "Such air bearing code may be used to simulate flying behavior of the head selected at step 22, namely flying the head above the simulated topography provided at step 21." Thus, the logical nexus between "simulating a head passing in near proximity to a simulated disc media surface" and "to generate an air bearing transfer function" is clearly provided in the specification.

The Examiner respectfully traverses this argument as follows.

Paragraphs [0029] and [0030] describe the process of "simulating a head passing in near proximity to a simulated disc media surface." These paragraphs do not describe an invention where "simulation" will "generate an air bearing transfer function."

Applicants' attention is respectfully drawn to paragraph [0032] of the specification, where it is disclosed that an air bearing transfer function "is determined for the selected wavelength of the simulated topography" which "may be calculated from the air bearing code." This disclosure appears separate and distinct from the limitations of claim 5 by describing the use of an air bearing code to determine an air bearing transfer function while claim 5 describes an act of simulation that leads directly to the generation of an air bearing transfer function.

Applicants' arguments have been fully considered but have been found unpersuasive.

The previous rejection of claim 5 under 35 U.S.C. § 112, second paragraph, regarding the step of "multiplying [...] to provide the head-media spacing modulation spectrum" is withdrawn in light of Applicants' amendments to the claim.

The previous rejection of claim 7 under 35 U.S.C. § 112, second paragraph, as lacking antecedent basis has been withdrawn in light of Applicants' amendments to the claim.

7. Claim 10 recites a step of "correlating results from the square-root-summing" which renders the claim indefinite. It is unknown to what the results from the square-root-summing are to be correlated.

In response, Applicants argue primarily that:

> Please refer to paragraph [0043] which states, "Correlation between GA (glide avalanche) and topography, HMS_Wq, HMS_Rq, and RMS sum of HMS-Wq and HMS-Rq, were plotted in Fig. 6." In short, the square-root-summing are correlated to glide avalanche. Paragraphs [0044] and [0045] further explain how the correlation is performed.

The Examiner thanks Applicants for this clarification, however the claim limitation recites "correlating results" without any indication to what the results will be correlated. An amendment to the claim that specifies that the results be correlated to glide avalanche would overcome this rejection.

Applicants' arguments have been fully considered but have been found unpersuasive.

Claims rejected but not specifically mentioned stand rejected by virtue of their dependence.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

8. Claims 5-16 and 18-20 are rejected under 35 U.S.C. § 102(a) as being anticipated by "The dynamic coupling of the slider to the disk surface and its relevance to take-off height" by Gonzalez et al., hereafter referred to as Gonzalez.

It is noted that Gonzalez was published in July 2001 but was presented on January 7-11, 2001 as noted on the citation provided with the reference.

Regarding claim 5, Gonzalez discloses a method of determining a portion of a head-media spacing modulation of a portion of an actual disk media surface [*"we calculate the frequency response of glide sliders to disk inputs of various wavelengths, using an air-bearing solver."* (abstract); *"From the simulation, the ratio of clearance modulation amplitude to the disk waviness amplitude is shown in Fig. 4..."* (page 2, right column)] comprising:

Simulating a head passing in near proximity to a simulated disk media surface [*"The response of the slider was simulated for flying at ~6.5 nm on a disk with waviness of 1 nm amplitude and wavelengths from 0.1 to 7 mm with a skew of 45° to the direction of motion of the disk."* (page 2, right column)];

Generating a topography function for the actual disc media surface (*disk roughness parameter*) [*"The roughness statistic that best estimates the highest peaks, the*

roughness peak mean R_{pm}, shows the best correlation with the measured take-off height data." (page 2, left column)]; and

Combining the topography function and air bearing transfer function to provide the head-media spacing modulation [*"The response of the slider was simulated for flying at ~6.5 nm on a disk with waviness of 1 nm amplitude and wavelengths from 0.1 to 7 mm with a skew of 45° to the direction of motion of the disk."* (page 2, right column)].

Regarding claim 6, Gonzalez discloses providing a head-media spacing waviness value for the disk media surface [*"The FFT of the disk roughness profiles from the 13 cells was filtered... and transformed back to obtain the filtered "effective" disk roughness."* (page 2, right column)].

Regarding claim 7, Gonzalez discloses sampling a portion of an actual disk media surface [*"Measurements of the disk roughness were made using a Tencor (EX) stylus profilometer."* (page 2, left column)], translating the actual disk topography to wavelengths and averaging the sampled wavelengths to provide a sampled topography spectrum [*"Data from the Tencor and Wyko was analyzed using programs written in Matlab to extract roughness statistics."* (page 2, left column); *"The response of the slider was simulated for flying at ~6.5 nm on a disk with waviness of 1 nm amplitude and wavelengths from 0.1 to 7 mm with a skew of 45° to the direction of motion of the disk."* (page 2, right column)].

Regarding claim 8, Gonzalez discloses the claimed steps of simulating (page 2, left column – page 3, left column, "III. Results").

Regarding claim 9, Gonzalez discloses providing a group of substrates [*"Disk substrates (13 cells) with various polishing conditions..."* (page 2, left column)] and determining roughness and waviness for each substrate [*"Data from the Tencor and Wyko was analyzed using programs written in Matlab to extract roughness statistics."* (page 2, left column); [*"The response of the slider was simulated for flying at ~6.5 nm on a disk with waviness of 1 nm amplitude and wavelengths from 0.1 to 7 mm with a skew of 45° to the direction of motion of the disk."* (page 2, right column)].

Regarding claim 10, Gonzalez discloses correlating the results [*"This correlation has a 95% confidence interval..."* (page 2, right column – page 3, left column)].

Regarding claims 11-15, these claims recite limitations that have no positively recited relation to the method of claim 5 from which they depend. Therefore claims 11-15 are interpreted as functionally equivalent to the method of claim 5. As Gonzalez anticipates claim 5, Gonzalez similarly anticipates claims 11-15.

Regarding claim 16, Gonzalez discloses a method of determining a portion of a head-media spacing modulation model [*"we calculate the frequency response of glide sliders to disk inputs of various wavelengths, using an air-bearing solver."* (abstract);

"From the simulation, the ratio of clearance modulation amplitude to the disk waviness amplitude is shown in Fig. 4..." (page 2, right column)] comprising:

Providing a disk topography having a wavelength [*"This code allows input of ... the waviness of the disk."* (page 2, right column); *"The response of the slider was simulated for flying at ~6.5 nm on a disk with waviness of 1 nm amplitude and wavelengths from 0.1 to 7 mm with a skew of 45° to the direction of motion of the disk."* (page 2, right column)];

Selecting a head to model [*"the dynamic modeling of the low flying 62% slider used in this experiment..."* (page 2, right column)];

Providing air bearing code for the head selected [*"The dynamic modeling of the low flying 62% slider used in this experiment was done using the CML dynamic air-bearing code [7]."* (page 2, right column)];

Simulating the head passing over the disk topography with the air bearing code [*"The response of the slider was simulated for flying at ~6.5 nm on a disk with waviness of 1 nm amplitude and wavelengths from 0.1 to 7 mm with a skew of 45° to the direction of motion of the disk."* (page 2, right column)]; and

Determining simulated head-media spacing modulating [Fig. 4; *"From the simulation the ratio of clearance modulation amplitude to the disk waviness amplitude is shown in Fig. 4..."* (page 2, right column)].

In response to these rejections, Applicants argue primarily that (all emphasis in original):

> The pending application claims benefit from Provisional Application 60/276,764 filed March 16, 2001. Gonzalez was published in July 2001. The examiner states that the IEEE

> meeting occurred on January 7-11, 2001. Thus, the Examiner is *speculating* that Gonzales, which was published in July 2001, was available at the time of the IEEE meeting in January 2001. However, this speculation of the Examiner is *totally without evidence*. Thus, Applicants respectfully submit that the Examiner has *not* established a *prima facie* case of anticipation.
>
> Once the Examiner establishes that Gonzales was available at the IEEE meeting in January 2001, Applicants may consider antedating Gonzalez by filing Rule 131 declaration. However, Applicants are under ***no*** obligation to file a Rule 131 declaration until it is *clearly established* that Gonzales was *available to the public* in January 2001.

The Examiner respectfully traverses this argument as follows.

Applicants' attention is respectfully drawn to the following:

The citation page attached to the Gonzalez reference states "Meeting Date: 01/07/01 – 01/11/01"

The first page of Gonzalez states "Manuscript received October 12, 2000"

The table of contents from "IEEE Transactions on Magnetics," July 2001, Volume 37, Number 4, Part 1, describes the contents as "Selected Papers from the Eighth Joint Magnetism and Magnetic Materials – International Magnetics Conference (MMM-INTERMAG) Mariott Rivercenter Hotel, San Antonio, Texas, January 7-11, 2001." The Gonzalez reference is listed on page 8 of that document.

The "Intermag 2000 –Call for Papers" Internet site states "The maximum paper length is six journal pages for invited papers and three journal pages for contributed papers. All manuscripts must be received by October 13, 2000," and "Papers must be presented at the Conference by an author registered at the Conference in order to be published in the Proceedings." It is noted that the Gonzalez paper has been published in the proceedings.

In light of the factual evidence summarized above, Applicants' allegation that the Gonzalez paper was unavailable at the time of the January 2001 conference is unpersuasive.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. § 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. § 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. § 103(c) and potential 35 U.S.C. § 102(e), (f) or (g) prior art under 35 U.S.C. § 103(a).

9. Claim 16 is rejected under 35 U.S.C. § 103(a) as being unpatentable over "Some Critical Tribological Issues in Contact and Near-Contact Recording" by D.B. Bogy, H.M. Stanley, M. Donovan, and E. Cha (1993) hereafter referred to as Bogy.

Bogy discloses a method of determining a head-media spacing modulation model (*simulation*) (section III, "Numerical Simulation of Spacing Variation and Asperity Impact Response", pages 233-234) comprising:

Providing a simulated disc topography having a wavelength [*"The results are calculated using the general purpose numerical simulation program for the head-disk assembly (HDA) dynamics... This program incorporates the suspension, slider, air bearing and disk." "[T]his is the first attempt to simulate unsteady spacing using the actual track topography"* (page 233, left column); *"the runout amplitude is only about 2μm, and it is essentially one wavelength for the entire track."* (page 233, right column)];

Selecting a head to model [*"We assume that the slider's rails are smooth. Spacing of 4mm slider and a 70% slider are calculated."* (page 233, left column); et cetera];

Providing air bearing code for the head selected [inherent in simulations such as, *"This program incorporates the suspension, slider, air bearing and disk,"* (page 233, left column)]; and

Simulating the head passing over the disc topography with the air bearing code (cited above).

Bogy teaches performing the simulation for an arbitrarily chosen wavelength [*"Both sliders are at 37mm from the center of the disk that is rotating at 3600 rpm."* (page 233, left column)].

It would have been obvious to a person of ordinary skill in the art to repeat the method disclosed by Bogy with a plurality of wavelengths, each defined by a combination of slider position and rate of disk rotation, because that person would immediately recognize that actual disk drives in normal use operate at a wide range of such values. Therefore the simulations would have greater fidelity and the simulation results would be more reliable if those results more closely reflected the normal use of a disk drive. This modification could be achieved by defining different parameters in the simulation for slider position and rate of disk rotation.

In response, Applicants argue primarily that:

> Claim 16 recites "providing disc drive operation parameters; determining an air bearing transfer function from the air bearing code." The Examiner has failed to establish a *prima facie* case of obviousness for having failed to explain where Bogy discloses the above limitations.

The Examiner respectfully traverses this argument as follows.

Bogy discloses providing disc operation parameters [*"Both sliders are at 37mm from the center of the* ***disk that is rotating at 3600 rpm.***" (page 233, left column)].

Body discloses determining an air bearing transfer function [inherent in the act of performing a simulation such as *"This program incorporates the suspension, slider, air bearing and disk."* (page 233, left column)].

Applicants' arguments have been fully considered but have been found unpersuasive.

Applicants further argue that:

> Furthermore, the Examiner has stated, "It would have been obvious to a person of ordinary skill in the art to repeat the method disclosed by Bogy with a plurality of wavelengths, each defined by a combination of slider position and rate of disk rotation, because that person would immediately

> recognize that actual disk drives in normal use operate at a wide range of such values." See page 15, lines 10-13, of the Action. Applicants respectfully submit that the Examiner is simply hypothesizing from the teachings of this invention. [...] Even if persons of ordinary skill would have known that actual disk drives in normal use have a plurality of wavelengths, which the Examiner has asserted *without* any evidence, there is no suggestion in Bogy that one should "determin[e] simulated head-media spacing modulation for each of a plurality of disc wavelengths" as recited in claim 16. According to the Examiner's logic, if person of ordinary skill in the art would have knowledge of an object or characteristics, then it automatically implies that persons of ordinary skill in the art would have been motivated to study that the object or characteristics [sic]. This logic is totally faulty.

The Examiner respectfully traverses this argument as follows.

The Examiner has asserted and maintains the assertion that people of ordinary skill in the art of disk drives are well aware that slider position and rate of disk rotation vary. If Applicants have evidence or declarations to the contrary, the Examiner will give them due consideration when they are provided.

The Examiner respectfully submits that he does not follow Applicants' argument. The Examiner does not understand Applicants' extrapolation based upon Applicants' interpretation of the Examiner's logic.

To be clear, the Examiner's logic is that a person of ordinary skill in an art of devices with a range of operating parameters, when presented with the teaching of a simulation at one set of operating parameters, would find it obvious to repeat that simulation for an appropriate variety of operating parameters. The Examiner is unaware of anything that is "automatically implied" by such logic.

That is, if a person knows that a device operates at speeds 1-10 and a prior art reference teaches a simulation of the device operating at speed 5, it would be obvious to a person of ordinary skill to simulate at speeds 1-4 and 6-10. The additional simulations would improve confidence in the simulation results.

Applicants' arguments have been fully considered but have been found unpersuasive.

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason Proctor whose telephone number is (571) 272-3713. The examiner can normally be reached on 8:30 am-4:30 pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached at (571) 272-3753. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 Group receptionist: 571-272-2100. Information regarding the

status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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7/7/06